

Background

Intensive rehabilitation of patients after severe traumatic brain injury aims to improve functional outcomes. The effect of initiating rehabilitation in the early phase, in the form of head-up mobilisation, is unclear. Objective To assess whether early mobilisation is feasible and safe in patients with traumatic brain injury admitted to a neurointensive care unit. To investigate the effects of orthostatic exercise on systemic and cerebral haemodynamic, and autonomic control of cardiovascular function in a population of patients with severe TBI.

Methods

This was a randomised parallel-group clinical trial, including patients with severe traumatic brain injury (Glasgow coma scale <11 and admission to the neurointensive care unit). The intervention consisted of daily mobilisation on a tilt-table for four weeks. The control group received standard care. Outcomes were the number of included participants relative to all patients with traumatic brain injury who were approached for inclusion, the number of conducted mobilisation sessions relative to all planned sessions, and adverse events and reactions. Exploratory outcomes assessed middle cerebral artery blood flow velocity (MCAv) using transcranial Doppler. For examination of autonomic reactions to head-up tilt 5-minutes and 24-hour electrocardiography (ECG) were recorded during the initial three days of the trial. Heart rate variability (HRV) analyses within the frequency and time domain were performed.

Results

Thirty-eight participants were included (19 in each group), corresponding to 76% of all approached patients [95% confidence interval (CI) 63–86%]. In the intervention group, 74% [95% CI 52–89%] of planned sessions were carried out. There was no difference in the number of adverse events, serious adverse events, or adverse reactions between the groups. During head-up tilt, the MCAv decreased by 10% to 16% in standing compared to supine in both groups. There were no signs of a protective mechanism on the orthostatic reaction during the four weeks of mobilisation. HRV of ECG data showed a decrease in standard deviation of normal-to-normal intervals, root mean squares of successive differences, and total power. The remaining variables remained unchanged to tilt. This was an opposite reaction to a healthy control group examined during head-up tilt.

Conclusions

Early head-up mobilisation is feasible in patients with severe traumatic brain injury. Larger randomised clinical trials are needed to explore the potential benefits and harms of such an intervention. No protective mechanism on the haemodynamic changes was detected and the MCAv decreased approximately the same as observed in healthy. A blunted reaction of the autonomic regulation was found during head-up tilt in patients with severe traumatic brain injury. Clinical Trial Registration: [ClinicalTrials.gov], identifier [NCT02924649]. Registered on 3rd October 2016.